

Soil Sorting

Purpose: Students will analyze soil and identify the components of soil. In addition, students will explore the role that soil plays in their lives and the importance of soil to farmers and food.

Time: 1 hour

Level: 1

Materials:

- Four, one quart samples of soil from different locations. Ideas for locations include:
 - Garden
 - Crop field
 - Animal pasture
 - Sandbox or sandy beach
 - Road ditch
 - Lake or stream bank
 - Construction site
 - Playground
- 40 small plastic bags or cups
- Newspaper or paper towels
- Magnifying glass or hand lens
- *Soil Observations* worksheet
- Construction paper cut in 1" x 11" strips
- Paper, tape, or stapler



Minnesota Science Standards and Benchmarks

- 1.1.1.1.2 Recognize that describing things as accurately as possible is important in science because it enables people to compare their observations with those of others.
- 1.3.1.3.2 Describe similarities and differences between soil and rocks.
- 1.3.1.3.3 Identify and describe large and small objects made of Earth materials.

Background

Soil is one of our most useful natural resources. From the soil we get food, clothes and materials for the houses we live in. Plants rely on the soil to provide moisture and nutrients for growth. The many fruits and vegetables that we eat on a daily basis require fertile soil to grow. Trees also utilize the soil and provide valuable lumber and wood to make paper and many additional products. Our animal food also comes from the soil. Cattle, pigs, sheep, chickens, turkeys and many other animals eat grass and grain to gain muscle and remain healthy. Without these plants, which depend on soil for survival, we would not have meat to eat. The animals also supply us with other products that we need for survival or make our lives much easier. These products include medicines, leather, soaps, lotions, rubber, paint, pet food and many others.

Soil can be defined as naturally occurring, unconsolidated or loose material at the surface of the earth which is capable of supporting plant and animal life. All soils have four major components. Two of these components are in the solid phase of matter. The first solid component is mineral matter. Mineral matter comes from the weathering of hard rock at the earth's surface. The other solid material in soil is organic matter. Organic matter is composed of dead and decaying plant and animal parts. This organic matter adds valuable nutrients to the soil that assist in plant growth. The solid parts of soil fit loosely together, leaving empty spaces called pores. These pores allow for the two other phases of matter to exist in soil. Water and other moisture fills in the pores along with air. In an average soil the pore space is occupied by 25 % air and 25% water. Water and air in the soil is very important to both plants and animals.

Students will make careful observations of soil samples and describe the different components that are present. In addition, students will describe how the soil affects their food, clothing and shelter.

Procedure

1. Collect approximately one quart of soil from four different locations. Try to get soils that have varied appearances, textures and uses. Suggestions are listed under **Materials**.
2. Label approximately 10 small bags or cups with #1, 10 with #2, 10 with #3, and 10 with #4. Label the four soil samples that you collected 1, 2, 3, and 4. Put one tablespoon of soil from soil sample 1

- in each bag/cup labeled #1. Put one tablespoon of soil from sample 2 in each bag/cup labeled #2. Continue for sample 3 and sample 4.
3. Hand out the soil observations worksheet to each student. Explain today that you will be making scientific observations and discoveries about soil. Ask the students:
 - a. Why should we care about soil? (Discuss - students may provide lots of interesting answers)
 - b. Why do you think farmers care about soil? (The soil is very important when growing our food, trees for shelter, and plants and animals used for clothing.)
 - c. What do you think is in soil that helps plants grow? (minerals, organic matter, water, air)
 4. Use one of the plastic bags/cups and model how you would like students to make observations. Instruct the students to dump the contents of just one bag out on a piece of newspaper. As a team, the students need to discuss and record the color, smell, and feel of the soil. Also model the use of a magnifying glass to see the small pieces that are in the soil. On your white board, draw an example of what you would like students to draw in their soil observations worksheet. After you have modeled all of the observations, pour the soil back into the plastic bag/cup.
 5. Organize students into groups of 2 or 3. Give each group 4 bags/cups – one labeled #1, one labeled #2, one labeled #3 and one labeled #4. Instruct students to analyze each soil, one at a time. Make sure the students pour the soil back into the bag/cup before they empty another bag/cup. Assist students in making the soil observations and recording these on their worksheet.
 6. After all groups have completed their observations, ask students to look at the bottom row where they have drawn what they see in the soil. Ask students:
 - a. What do all of the soils have in common?
 - b. What is different about the soils?
 - c. Where do you think soil 1 is from? (repeat with soils 2-4)
 - d. What do you think soil 1 is used for? (growing food, playing, building a new home, etc)
 7. Tell students that even though soils look different and have different uses, all soils are made up of the same four major parts. Ask students to look at their drawings. They should see:
 - a. Small, rock or bead-like particles. These are called mineral matter. This mineral matter helps the soil have shape and also help plants grow
 - b. Leaves, sticks, straw, worms, beetles, etc. This is called organic material. Organic means that it is living or was living at one time. Organic material adds lots of nutrients to the soil that plants use to grow.
 - c. Water or moisture. Plants must have water or they will die. The soil holds water so roots can soak it up for the plant to use.
 - d. Air. Plants also need air or they will die. Plants use the air in the soil to help the plant grow and survive.
 8. Tell students that soil is important. Everybody uses soil every day. Have the students turn their soil observations worksheet over so they have nice clean sheet of blank paper. Ask students to think of something they use (eat, wear, etc) everyday and write this word at the top of their paper.

9.



Provide an example to the students of something you use almost every day. On your whiteboard, draw a flow chart (using pictures and words) to show how this item is connected to the soil. *See the attachment for examples.*

10. Instruct the students to create a flow chart that links the item they wrote down to the soil.
11. Have the students create a soil chain. Each student needs to count the number of steps in their flow chart – that is how many strips of paper the student needs. On each strip, the student writes one of the steps in their flow chart. These strips will become “links” in their chain.
12. Assist students in forming each strip into a circle, tape, glue, or staple the ends together. Combine each link so you have formed a short paper chain – a “soil chain.” OPTIONAL: you can challenge students to try to create the longest or shortest soil chain.

Additional Activities

- Create a mini science experiment by placing the four different soils in different pots and trying to grow a specific type of seed (peas, lettuce, pumpkins, etc.) in each soil. Provide consistent light and water to each pot and monitor the seed sprouting and growth. Compare the difference in growth and appearance in the different soil samples.
- Read the book *Dirt: The Scoop on Soil* by Natalie M. Rosinsky. This book and a ready guide are available through Minnesota Agriculture in the Classroom.
<http://www.mda.state.mn.us/kids/childrens-lit-bundle.aspx>

Adapted from Utah Agriculture in the Classroom.